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ABSTRACT

Little empirical research has been done on the subject of argumentation, especially in the area of refutation, or "disproof," even though some research on debate indicates that refutation constitutes a significant predictor of a team's success. A recent study investigated the effects of eight forms of refutation against five major categories of argument: example, residues, dilemma, analogy, and cause. The refutation techniques included those five argumentative types plus attacks on evidence, attacks on reasoning, and "turning the tables." Results of a survey to determine attitude change on statements relating to a controversial issue (government guarantee of a minimum annual income) indicated that: (1) argument by example is especially persuasive; (2) attack on reasoning, in keeping with traditional theory, is also especially persuasive; and (3) attack on evidence is curiously unpersuasive. There appears to be an inverse relationship between the effectiveness of the type of initial argument and its effectiveness as refutation. In addition, arguments drawn from inductive reasoning appear to be most effectively refuted by arguments in the same category. (RN)

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THE EFFECTS OF REFUTATIONAL TECHNIQUES ON ATTITUDE CHANGE

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THE EFFECTS OF REFUTATIONAL TECHNIQUES ON ATTITUDE CHANGE

Despite the fact that argumentation remains a major academic concern, little empirical research appears to have been completed on the subject. However, this does not mean that researchers have been uninterested in the strength of arguments and refutation. Gilson and Abelson[1] chided some psychologists for overemphasizing motivation to the exclusion of argument, or what they term the "reality component." Schunk[2] and McGuire[3] related attitude formation and change to probability estimates of arguments, while Woodworth and Schlosberg[4] and DeSoto, London, and Handel,[5] investigated the logic of ordering concepts within a universe of events. Still others related drive strength and argument to speed of response.[6] But none of these studies sought to explain what characteristics of arguments related to their strengths and weaknesses. In fact, aside from some scattered work with the syllogism[7] very little research on the effects of logic has been conducted. An exception of sorts was research on analogy by McCroskey and Combs,[8] yet these researchers made no comparison of analogy with other argumentative forms.

Refutation has likewise been given limited attention. Despite the fact that rhetorical theory may provide some predictions for refutational strategies [i.e., attack the reasoning of the argument first; pose a counter-dilemma in response to a dilemma],[9]

only minor consideration has been given to the notion. For example, refutation plays a key part in McGuire's innoculation theory, yet he fails to detail its parameters of effectiveness.[10] Some debate research has reinforced the belief that refutation constitutes a significant predictor of success. For example, Keeling found that the better a team's ability to conduct refutation in a round of debate, the more likely that team was to win the critic's decision.[11] Reinard found a pattern of success when certain types of negative cases were pitted against different forms of affirmative cases.[12] However, such research has not dealt with the specific types of arguments which influence the success or failure of refutation. Furthermore, no investigation seems to have been completed reporting which types of refutational arguments are most effective.

Purpose and Definitions

It was the purpose of this study to investigate the effects of eight types of refutation against five major types of initial (affirmative) argument. The problem-hypothesis was non-directional, reflecting the exploratory nature of this study and was offered as a place from which to stimulate other analyses of the subject area. The literature on the subject seemed so inconclusive that no directional hypotheses were formulated.

For the purposes of this study, refutation was defined as "disproof . . . proof employed to meet and overthrow opposing argument."[13] In other words, when an argument is refuted, its persuasive impact has been blunted and opinion change is expected in the direction of the disproof.

The types of initial argument which were studied may be defined as follows:

Argument by example: The process of inferring conclusions from specific cases.[14]

Argument by residues: Establishing a given proposition by overthrowing all alternative propositions which might be substituted for it.[15]

Argument by dilemma: Two lines of proof are presented to an opponent, one of which he must accept, and either of which will destroy his contention.[16]

Argument by analogy: Comparing similar cases and asserting that what is true of one is true in the other.[17]

Argument by cause: Inferring that a certain factor (cause) is a force that produces something else (effect).[18]

In addition to the use of one argumentative type to counter another, refutation may be affected by three additional techniques:

Attack on evidence: Applying the tests of evidence and demonstrating that the evidence advanced by the opposition fails to meet these tests.[19]

Attack on reasoning: Applying the tests of reasoning and demonstrating that the reasoning of the opposition fails to meet these

tests.[20]

Turning the tables: Accepting one of the opponent's premises and from it establishing the opposite conclusion.[21]

The categories of exposing fallacies, exposing inconsistencies, and exposing irrelevant arguments were all considered as attacks on reasoning because they have as their bases the assertion that the requirements of proof have not been satisfied.

With these constitutive definitions in mind, the researchers invented specific arguments for each classification. Construction followed a strict pattern: statement of the argument with reason for its belief, evidence, and restatement of the argument as summary.

Procedures

Given the nature of the study, the major input of the researchers into the setting was the survey instrument, a set of test booklets containing the initial arguments, refutational arguments, and dependent attitude measures. All arguments were related to the topic, Resolved: that the federal government should guarantee a minimum annual cash income to all citizens.

The experimental group read the original arguments first. After responding to statements of the original arguments on seven-point Semantic Differential-type scales (pretest), they were exposed to the original argument followed by refutation. Subjects were then asked to evaluate a statement of the original argument (posttest) on the attitude scales. Control groups received treatments appropriate to their control group task

according to the Solomon Four Group Design.[22]

There were eighteen forms of the ten-item test booklets including booklets for three controls groups. The booklets were numbered, placed in random order, and distributed to subjects in their classrooms. Each booklet contained two examples of each type of original argument with order of appearance systematically varied to control for possible subject fatigue. The study was introduced in the written instructions as a survey of attitudes on public issues.

In order to verify the operationalizations of each original argument and refutation type, validation was completed by means of an expert jury. All expert jurors were professional speech communication educators or graduate students in speech communication. All had been or presently are active in forensics and all had extensive background knowledge of place logic, such as that used in this study. Fifteen of the twenty jurors filled out questionnaires in which they identified each argument type. An agreement level of .80 was established--if an argument did not receive a consistent rating of at least eighty percent agreement among jurors, it was revised by the authors. Following a tally of results and interviews with jurors, twelve refutational arguments were revised. The revised refutational arguments (often involving only word deletions or other slight changes) were then evaluated by five jurors whom the experimenters had reserved for revalidation checks. The consistency level was above .80 in all instances and the validated argument types were accepted for use in the experiment.

Subjects

Subjects were randomly selected[23] from students in the basic speech courses at Cerritos College, Santa Ana Community College, and California State University, Fullerton.[24] Given the experimental design and the test instrument, the responses of 270 subjects were required.[25] This sample provided enough data to allow thirty responses--after random sampling from an originally larger sample--for each cell.

Controls

In addition to the controls implicit within the four-group design, additional steps were taken to control for extraneous and potentially confounding variables. The experimenters placed controls on language by use of Lynch's Human Interest Quotient,[26] source credibility of evidence sources by employing a pilot test for ethos of various magazines,[27] recency of evidence by withholding any references to dates, prior knowledge with the topic by pilot testing audience familiarity with the guaranteed income topic,[28] various personality responses by randomization, and subject fatigue by systematic variation in order of appearance of the arguments. Since paper and pencil tests were used, complete random assignment of subjects to test conditions was possible. To assure randomness, however, a larger sample was taken from which the 270 subjects were randomly selected. Hence, randomization was provided in two steps: (1) random assignment and (2) random selection.

Statistical Analysis

The amount of attitude change for each subject was determined and the gain scores subjected to a five-by-eight factorial analysis of variance. Newman-Keuls analyses for differences among means were computed where appropriate.[29] The alpha level for all statistical tests was set at .05.

Pilot Study

To gain information about the sample, a pilot study was conducted using seven-point "agree-disagree" scales as the criterion measure. Results of the five-by-eight ANOVA revealed one main effect (F=2.178 .05) from the types of refutation, with attack on reasoning producing the greatest amount of attitude change.

Test interaction, however, was observed at three locations in the five-by-eight matrix. Additionally, factor analysis revealed that the "agree-disagree" scales did not load as anticipated (proportion of variance=.16). Therefore, the experimenters completed a replication employing the same sample and procedures but using a different set of evaluatively factored scales (proportion of variance=.84): "bad-good," "beneficial-harmful," "negative-positive," "wise-foolish," and "fair-unfair." This time no test interaction was observed.[30]

Results

The analysis of variance (reported in Table 1) produced two main effects among the strengths and weaknesses of initial

argument and among the strengths and weaknesses of refutation types. Significant interaction between initial argument and refutation type was also observed.

[insert Table 1 approximately here]

The Newman-Keuls analysis (reported with other analyses on Table 2) on the main effect from initial argument type isolated the source of observed variation as related predominately to the effectiveness of refutation against argument by cause, argument by analogy, and argument by residues, as compared to the more invulnerable initial argument by example and argument by dilemma.

Newman-Keuls analysis of the main effect of refutational argument types isolated the sources of variation as predominately related to the strength of attack on reasoning and argument by cause, compared to other refutational types. Attack on evidence was found to be the least effective method of refutation. More specific, argument by argument analyses were completed.

The analysis of refutation types against initial argument by example showed significant mean differences between the relative ineffectiveness of attack on evidence and the more persuasive argument by example and attack on reasoning. In fact, only when compared to attack on evidence were argument by example and attack on reasoning found to be significantly more persuasive argument types.

Analysis of refutation of initial argument by residues

showed significant mean differences between the strength of attack on reasoning and the weaknesses of (in descending order) argument by dilemma, residues, attack on evidence, and turning the tables. No significant differences were noted among attack on reasoning, cause, analogy, and example.

Analysis of refutation of argument by dilemma showed no significant mean differences among the eight types of refutation. Even here, however, attack on reasoning ranked as the most persuasive form of refutation.

Newman-Keuls analysis of refutation against argument by analogy showed a significant mean difference between analogy, the most effective refutation technique, and attack on evidence, the least effective refutation technique.

Analysis of refutation types against argument by cause produced significant mean differences between agrument by cause, the most effective refutational response, and all seven of the remaining forms of refutation. No other significant differences were noted.

[insert Table 2 approximately here]

The significant interaction effect can be explained by comparison of cell means. In some cells, the particular combination of initial argument and refutation appeared to facilitate the effectiveness of the particular form of refutation, more than other cell combinations. For instance, comparatively speaking, the single most persuasive form of

of refutation appeared to be when argument by cause was employed to refute argument by cause. The second most effective form of refutation appeared to be when argument by analogy was used to refute argument by analogy. Thus, these particular cell combinations may have accounted for much of the significant interaction effect.

A cursory view of the results might lead one to explain the interaction effect with the claim that a given argument seemed to be most persuasively refuted by its own type. That is, one argumentative form may serve to make a succeeding similar argumentative type more persuasive since the pattern of attention and comprehension to the form of reasoning had immediately before been established in the mind of the receiver. Such a "cognitive patterning" interpretation would explain the effects of refutation of argument by example, analogy, and cause (typically considered inductive forms of reasoning),[31] but would not so easily explain the failure of initial arguments by residues and dilemma (typically considered deductive forms of reasoning)[32] to be most effectively refuted by their own kind. On the other hand, after the completion of further research it might be determined that some form of the "cognitive patterning" approach provides a theoretic basis for describing the persuasive effects of inference. While hesitant to adopt a "cognitive patterning" approach based on this preliminary research, the experimenters are optimistic about the potential such a paradigm might have for explanation and prediction in

future research.

Additional examination of the data led the researchers to believe that an inverse relationship existed between the effectiveness of arguments used in favor of a proposition and those used to oppose a proposition. It was noticed, for instance, that although argument by example was the least vulnerable form of initial argument across refutation types, it was a relatively unpersuasive form of refutation across initial argument types. Similarly, argument by cause was found to be an effective form of refutation despite the fact that it was among the least effective forms of initial argument. Computation of a Pearson Product Moment correlation using row and column means as scores revealed a correlation of -.711 between the effectiveness of an argument type when used as initial argument and when used as refutation. This suggested that significant interaction may have been attributable to the fact that behavioral impact of argument changes with the purpose to which it is put.

Discussion

Given such findings some tentative explanations seem in order. These should be treated as most tentative since insufficient behavioral research has been completed to justify a universal explanation for the manner in which arguments produce persuasive effects. Behaviorists in argumentation appear to be at a pre-theoretical stage in their explanation of how people make persuasive sense. Moreover the quest for

theory has been hampered by a dearth of empirical research on reasoning and argument. It is hoped that with this study and others planned by the researchers, later theoretic development may be possible.

Before considering explanations for the manner in which specific argument forms produced attitude change, the two most important findings of this study should be recapitulated. First, the data in this study suggest that inductive arguments (example, analogy, and cause) might be most persuasively refuted by their own type. Thus, it is possible that by processing an initial inductive argument, the immediate use of that argument form in refutation is more easily comprehended since the thought pattern has already been established. This "cognitive patterning" approach, the researchers believe, may hold promise for future theory-building in argumentation. Second, the discovery of an inverse relationship between the effectiveness of an argument form as initial argument and its persuasiveness as refutation implies that a functional distinction exists between communication in favor of a proposition, and argumentation used in refutation. Support was found for the belief that those arguments which are most effective as initial argument tend to be less persuasive as refutation, while those arguments less effective as initial argument tend to be more persuasive as refutation. The current popular application of place logic seems to minimize the distinction between argument in favor and in opposition to a proposition and, as such, may

be in need of serious re-examination. Provided the observations reported in this study are typical and accurately measured, refutation should be considered a separate genre of persuasive communication occurring in adversary settings.

As concerns specific initial arguments, argument by example may prove to have been persuasive because it relates specific sense data--in the form of individual cases--to the receiver in order to secure proof. Such individual cases may be more easily understood and internalized by a receiver than other, more abstract patterns which seek to persuade by demonstrating a complex relationship of concepts to one another. Of course, this tentative explanation is predicated on the assumption that a person is more likely to be persuaded by what he may relate to his own personal experience. To the extent this empirically testable assumption is untrue, the explanation that argument by example gains its effectiveness as initial argument by making obvious what might otherwise remain abstract and unspecific, likewise would be tenuous.

One potential explanation for the observation that cause argument was relatively uncompelling as an initial argument may lie in the tendency of receivers to be skeptical of any assertion of allegedly "simple" logical relations, such as the causal linear assertion, "If A, then B."[33] If, as J. Samuel Bois has suggested, patterns of thought are changing from a linear pattern to a more systemic extensional orientation,[34] one need not consistently expect audience acceptance of policy

changes to be influenced significantly by linear argument, although argument against change might be influenced strongly by linear thought. Although not addressing Bois' perspective, Robyn Dawes reported some supportive research which determined that it was more common for receivers to perceive simple relationships as complex, than to perceive nested concepts as simple.[35] Thus, it may be that when policy change is involved in a world perceived as complex, cause arguments may appear too simplistic to be compelling.

As regards refutation, support was found for the traditional textbook advice favoring general use of attack on reasoning across initial argument types. Other expectations drawn from argumentation texts, however, were not consistently supported. A curious finding was the general unpersuasiveness of attack on evidence across initial argument types. Such an observation appeared inconsistent with traditional argumentation theory which held that evidence is the philosophical basis for belief. According to that conceptualization, if evidence used to support an argument is impugned, the persuasive impact of the argument should be negligible. A follow-up review of the specific operationalizations revealed that two types of attack on evidence were employed: attack on the evidence source as biased or incompetent, and attack on the inferential patterns within the evidence, itself. This might suggest that further specification is necessary in the current conception of attack on evidence, and attention be directed toward the identification

of functional sub-types of refutation. To this end, the researchers are planning additional experimentation including these sub-types.

The apparent effectiveness of analogy as refutational argument may seem surprising in light of argumentation theory's common view of analogy as a weak form of proof at best. In spite of research by McCroskey and Combs on the importance of analogical argument, and Gurova on the importance of analogical thought,[36] argumentation literature has been hesitant to recognize the persuasive role of analogy in communication. Since the present research is consistent with previous study on the persuasiveness of analogy, it seems that past argumentation theory may deserve thoughtful re-evaluation. It is possible that analogical cognition may prove as important to argumentative effectiveness as both Perelman[37] and Piaget[38] consider it to be in general human behavior. It seems clear that argument by analogy should be examined more closely with respect to its apparent effectiveness as an argumentative type.

As a final caveat, it should be noted that this research is limited in two major respects. First, since different messages were required for experimental manipulation, it is always possible that the messages were not comparable. Despite the controls placed on language emotiveness, source credibility of evidence, recency of evidence, prior-familiarity with topic, and fixed pattern of argument construction, it

it is impossible to be certain that other attributes of the messages did not introduce uncontrolled variances which confounded the independent manipulations. With future research accounting for increasing amounts of variation within the message, confirmation of the findings of this study may become possible. Until that time, however, the results reported here must be considered only as tentatitive probings of a major area in communication research. Second, the researchers believe that those theories with the greatest heuristic value are those which consider the nature of the receiver in addition to the nature of the message. As such, this preliminary research, concerned solely with manipulating messages--when taken by itself--may provide data leading to the construction of a partial theory of argument, not a complete theoretical position. Future research by the authors will be directed toward investigating the interaction of arguments with key receiver variables, and could facilitate the construction of a comprehensive, empirically-based theory in argumentation. However, until such research is completed, any attempt at theorizing from this single study may have limited heuristic potential.

Summary

This study sought to investigate the persuasiveness of refutational techniques and initial argument forms. Significant differences were found among initial arguments--especially

persuasive was argument by example--and among refutational types. Attack on reasoning, in keeping with traditional argumentation theory expectations, was especially persuasive while attack on evidence was curiously unpersuasive.

Noting a significant interaction effect, the researchers postulated an inverse relationship between the effectiveness of an argument as initial argument, and its effectiveness as refutation. Additionally, it was postulated that inductive arguments appear to be most persuasively refuted by their own type.

Viewing favorably the potential for theory inherent in the interaction of a "cognitive patterning" conception, the consideration of refutation as a distinct genre of argument, and the consideration of key receiver variables, the researchers plan future studies in the area.

FOOTNOTES

[1]Charlotte Gilson and Robert P. Abelson, "The Subjective Use of Inductive Evidence," Journal of Personality and Social Psychology, 2 (1965), 301-310.

[2]John Schunk, "Probability and Desirability Determinants of Relationships Among Beliefs in Rhetorical Propositions," Unpubl. diss. (University of Illinois, 1967).

[3]William J. McGuire, "A Syllogistic Analysis of Cognitive Relationships," Attitude Organization and Change, Rosenberg, et. al., eds. (New Haven: Yale University Press, 1960); "Cognitive Consistency and Attitude Change," Journal of Abnormal and Social Psychology, 60 (1960), 345-53; See also Ronald C. Dillehay, Chester A. Insko, and M. Brewster Smith, "Logical Consistency and Attitude Change," Journal of Personality and Social Psychology, 3 (1966), 646-54.

[4]R.S. Woodworth and H. Schlosberg, Experimental Psychology (New York: Holt, 1954), p. 843.

[5]Clinton B. DeScto, Marvin London, and Stephen Handel, "Social Reasoning and Spatial Paralogic," Journal of Personality and Social Psychology, 2 (1965), 513-21.

[6]R. W. Black, "On the Combination of Drive and Incentive Motivation," Psychological Review, 72 (1965), 310-17; K. W. Spence, Behavior Theory and Conditioning (New Haven: Yale

University Press, 1956); R. F. Weiss, "Deprivation and Reward Magnitude Effects on Speed Throughout the Goal Gradient," Journal of Experimental Psychology, 60 (1960), 384-90.

[7]See J. J. B. Morgan and J. T. Morton, "The Distortion of Syllogistic Reasoning Produced by Personal Convictions," Journal of Social Psychology, 20 (1944), 39-59.

[8]James C. McCroskey and Walter H. Combs, "The Effects of the Use of Analogy on Attitude Change and Source Credibility," Journal of Communication, 19 (1969), 333-39.

[9]See Austin J. Freeley, Argumentation and Debate: Rational Decision Making, 3rd ed. (Belmont, Ca.: Wadsworth, 1971), pp. 256-57; David Shepard and Paul H. Cashman, A Handbook for Beginning Debaters, 3rd ed. (Minneapolis: Burgess, 1966), pp. 48-49; Arthur N. Kruger, Modern Debate: Its Logic and Strategy (New York: Holt, 1960), pp. 229-30; and Henry Lee Ewbank and J. Jeffery Auer, Discussion and Debate: Tools of a Democracy, 2nd ed. (New York: Appleton, 1951), p. 143.

[10]For a summary of this material see William J. McGuire, "Inducing Resistance to Persuasion: Some Contemporary Approaches," Advances in Experimental Psychology, I (New York: Academic Press), pp. 191-229.

[11]Russell M. Keeling, "An Analysis of Refutation and Rebuttal in Interscholastic Debate," Unpubl. thesis (Baylor

University, 1959), pp. 89-91.

[12]John C. Reinard Jr., "Negative Responses to Affirmative Case Approaches: A Pilot Study," Unpubl. thesis (California State University, Fullerton, 1971).

[13]Warren Choate Shaw, The Art of Debate (Boston: Allyn and Bacon, 1922), p. 120.

[14]Freeley, p. 117.

[15]Shaw, p. 129.

[16]Ibid., p. 130.

[17]Freeley, p. 120.

[18]Ibid., p. 122.

[19]Freeley, p. 256.

[20]Ibid.

[21]Shaw, p. 125.

[22]Robert L. Solomon, "An Extension of Control Group Design," Psychological Bulletin, 46 (1949), 137-50.

[23]Randomization accomplished via RANDNO CDC program.

[24]The authors wish to express their gratitude to Ron Tabor and Bill Lewis of Cerritos College, Trish Whitney of

Santa Ana College, and Lee Granell of California State University, Fullerton.

[25]The casual observer might note that in a five-by-eight design using the four group method, the number of responses required would appear to be 4800. This, however, should not lead to the conclusion that 4800 different people actually were required for the study. With each subject responding to two types for each of the five categories of original arguments, 120 subjects were required, each taking a ten-item test, for the experimental group and control group two [total= 240]. [NOTE: Subjects in the experimental group received an equal number of pro and con arguments during completion of each test booklet.] Likewise, with two examples of each initial argument, only fifteen subjects were required to produce thirty responses for control groups one and three. It was additionally found--regardless of the cell--control groups one and three were used to tap the same relevant information (opinion toward the initial argument statements with and without pretests). The refutation changed from cell to cell, not the pretest or posttest. Hence, control group one and control group three--once subjects were designated for them--were used for all cell comparisons [15+15+120+120=270].

[26]For procedure and background see Mervin D. Lynch, "The Measurement of Human Interest," Journalism Quarterly, 45 (1968), 226-34. See also discussion and recommendations

in Lynch, "Stylistic Analysis," Methods of Research in Communication, Emmert and Brooks, eds. (Boston: Houghton Mifflin, 1970), pp. 329-36. Standard deviation of scores was 2.72 and possible range of HQ' scores is from zero to seventy-seven.

[27]Fifty titles of magazines were chosen from the Reader's Guide to Periodical Literature and evaluated by a group of thirty-four subjects from the larger sample using James C. McCroskey's scales for the measurement of source credibility. "Scales for the Measurement of Ethos," Speech Monographs, 33 (1966), 65-72. Those magazines which scored within the "neutral" scale intervals were selected for use in the study.

[28]In a pilot survey of thirty-one subjects selected from the larger population, five topics were assessed on a seven-point "familiar-unfamiliar" scale. The guaranteed income topic was chosen since it proved to be a topic of "neutral" familiarity (mean=4.1).

[29]Dean J. Champion, Basic Statistics for Social Research (Scranton, Pa.: Chandler, 1970), pp. 124-27.

[30]To estimate the existence of test interaction the two-by-two ANOVA technique was employed according to the explanation by Donald T. Campbell and Julian C. Stanley, Experimental and Quasi-Experimental Designs for Research

(Chicago: Rand McNally, 1963), p. 25.

[31]See Wesley C. Salmon, Logic (Englewood Cliffs, N.J.: Prentice-Hall, 1963), ch. 3.

[32]Ibid., ch. 2; Argument by residues (termed "argument from circumstance") was classified as deductive by Jack Ray and Harry Zavos, "Reasoning and Argument: Some Special Problems and Types," Perspectives on Argumentation, Miller and Nilsen, eds. (Chicago: Scott, Foresman, 1966), p. 100.

[33]Such linear assertions were typical of the two initial arguments by cause used in the operational phase of this experiment: "Elimination of the "means test" would free social workers to conduct rehabilitation services;" and "A guaranteed annual cash income would provide the necessary climate of security required to break the "cycle of poverty"."

[34]J. Samuel Bois, The Art of Awareness (Dubuque,Iowa: Brown, 1966), ch. 1.

[35]Robyn Dawes, "Cognitive Distortion," Psychological Reports, 14 (1964), 443-59.

[36]L. L. Gurova, "The Function of Concrete and Imagery Components in Problem Solving," Vosprosy Psikhologii, 15 (1969), 76-89.

[37]Ch. Perelman and L. Olbrechts-Tyteca, The New Rhetoric: A Treatise on Argumentation, Wilkinson and Weaver, trans. (Notre Dame, Ind.: University of Notre Dame Press, 1969), pp. 371-98.

[38]Jean Piaget, Judgment and Reasoning in the Child (New York: Harcourt, 1928); The Language and Thought of the Child (London: Routledge, 1932); The Construction of Reality in the Child (New York: Basic Books, 1954). For a different, although related perspective see Robert E. Haskell, "Anatomy of Analogy: A New Look," Journal of Humanistic Psychology, 8 (1968), 161-69.

TABLE 1

Analysis of Variance
for
Experimental Group Gain Scores

Source of Variation	Degrees of Freedom	Mean Squares	F Ratio
Initial Argument	4	768.958	16.770 *
Refutation	7	230.181	5.020 *
Interaction	28	99.027	2.160 *
Within Groups	1160	45.851	
Total	1199		

* Significant at the .05 level

TABLE 2

A Summary[a] of Rankings[b] from Newman-Keuls Analyses of the Persuasiveness of Refutation Techniques Against Each Type of Initial Argument[c]

Refutation Type	Example	Residues	Dilemma	Analogy	Cause	Rankings for Refutation Type Main Effect
Example	1 s	4 j	8	7	4 j	5 j
Residues	3	7 j	5	2	3 j	3 j
Dilemma	6	8 j	7	6	5 j	7 jk
Analogy	4	3	6	1 s	7 j	4 j
Cause	7	2	4	4	1 kmnp qrs	2 qrs
Attack on Evidence	8 jk	6 j	2	8 j	6 j	8 jk
Attack on Reasoning	2 s	1 nqrs	1	3	2 j	1 mnp qrs
Turning the Tables	5	5	3	5	8 j	6 jk
Rankings for Initial Argument Type Main Effect[d]	5 jkm	3 p	4 jk	2 np	1 np	

[a]This table is a summary of seven separate Newman-Keuls tables which are on file in the ERIC system appended to the authors' Western Speech Communication Convention paper, "An Experimental Study of the Effects of Refutation Techniques on Change of Opinion."

[b]Ranking is in descending order, i.e., refutation which produced the greatest attitude change was ranked "1". Each column in the main matrix should be considered independently.

[c]To indicate differences (significant at the .05 level) between rankings, the following code is employed:

j=difference between this ranking and number one rank.
k=difference between this ranking and number two rank.
m=difference between this ranking and number three rank.
n=difference between this ranking and number four rank.
p=difference between this ranking and number five rank.
q=difference between this ranking and number six rank.
r=difference between this ranking and number seven rank.
s=difference between this rnaking and number eight rank.

[d]Initial argument in the main effect analysis row which is ranked number one was most vulnerable to refutation. Most invulnerable initial argument was ranked number five.

TABLE A

NEWMAN-KEULS ANALYSIS
OF
ORIGINAL ARGUMENT TYPES

	E	D	R	A	C
EXAMPLE		1.65	3.26*	3.79*	4.42*
DILEMMA			1.61*	2.13*	2.77*
RESIDUES				.52	1.16
ANALOGY					.63
CAUSE					

* SIGNIFICANT AT THE .05 LEVEL

TABLE B

NEWMAN-KEULS ANALYSIS
OF
REFUTATION TYPES

	Ev	D	TT	E	A	R	C	Rs
ATTACK ON EVIDENCE		.20	.55	1.49	1.49	1.76	2.72*	3.59*
DILEMMA			.35	1.29	1.29	1.56	2.52*	3.59*
TURNING THE TABLES				.94	.94	1.21	2.17*	3.03*
EXAMPLE					.00	.27	1.23	2.09*
ANALOGY						.27	1.23	2.09*
RESIDUES							.96	1.83*
CAUSE								.87
ATTACK ON REASONING								

* SIGNIFICANT AT THE .05 LEVEL

TABLE C

NEWMAN-KEULS ANALYSIS
OF
REFUTATION OF ARGUMENT BY EXAMPLE

	Ev	C	D	TT	A	R	Rs	E
ATTACK ON EVIDENCE		1.63	1.63	2.10	2.5	4.27	6.00*	6.17*
CAUSE			.00	.47	.87	2.63	4.37	4.53
DILEMMA				.47	.87	2.63	4.37	4.53
TURNING THE TABLES					.40	2.17	3.90	4.07
ANALOGY						1.77	3.50	3.67
RESIDUES							1.73	1.90
ATTACK ON REASONING								.17
EXAMPLE								

* SIGNIFICANT AT THE .05 LEVEL OF CONFIDENCE

TABLE D

NEWMAN-KEULS ANALYSIS
OF
REFUTATION OF ARGUMENT BY RESIDUES

	D	R	Ev	TT	E	A	C	Rs
DILEMMA		.07	.23	.46	2.50	2.73	4.23	5.77*
RESIDUES			.17	.40	2.43	2.67	4.17	5.70*
ATTACK ON EVIDENCE				.23	2.27	2.50	4.00	5.53*
TURNING THE TABLES					2.03	2.27	3.77	5.30*
EXAMPLE						.23	1.73	3.27
ANALOGY							1.50	3.03
CAUSE								1.53
ATTACK ON REASONING								

* SIGNIFICANT AT THE .05 LEVEL

TABLE E

NEWMAN-KEULS ANALYSIS
OF
REFUTATION OF ARGUMENT BY DILEMMA

	E	D	A	R	C	TT	Ev	Rs
EXAMPLE		.40	.63	2.00	2.47	2.70	3.43	3.50
DILEMMA			.23	1.60	2.07	2.30	3.03	3.10
ANALOGY				1.37	1.83	2.07	2.80	2.87
RESIDUES					.47	.70	1.43	1.50
CAUSE						.23	.97	1.03
TURNING THE TABLES							.73	.80
ATTACK ON EVIDENCE								.07
ATTACK ON REASONING								

* SIGNIFICANT AT THE .05 LEVEL

TABLE F

NEWMAN-KEULS ANALYSIS
OF
REFUTATION OF ARGUMENT BY ANALOGY

	Ev	E	D	TT	C	Rs	R	A
ATTACK ON EVIDENCE		1.90	2.53	3.33	4.00	4.93	5.47	6.83*
EXAMPLE			.63	1.43	2.10	3.03	3.57	4.93
DILEMMA				.80	1.47	2.40	2.93	4.30
TURNING THE TABLES					.67	1.60	2.13	3.50
CAUSE						.93	1.47	2.83
ATTACK ON REASONING							.53	1.90
RESIDUES								1.37
ANALOGY								

* SIGNIFICANT AT THE .05 LEVEL

TABLE G

NEWMAN-KEULS ANALYSIS
OF
REFUTATION OF ARGUMENT BY CAUSE

TT	A	Ev	D	E	R	Rs	C
TURNING THE TABLES	.60	2.17	2.27	2.73	2.83	3.57	7.10*
ANALOGY		1.57	1.67	2.13	2.23	2.97	6.50*
ATTACK ON EVIDENCE			.10	.43	.67	1.40	4.93*
DILEMMA				.47	.57	1.30	4.83*
EXAMPLE					.10	.83	4.37*
RESIDUES						.73	4.27*
ATTACK ON REASONING							3.53*
CAUSE							

* SIGNIFICANT AT THE .05 LEVEL OF CONFIDENCE

NOTE: ALL NEWMAN-KEULS ANALYSIS TABLES INCLUDE REFUTATION TYPES LISTED IN ASCENDING ORDER OF PERSUASIVENESS, i.e., THE FIRST TYPE LISTED WAS FOUND TO BE LEAST PERSUASIVE WHILE THE REFUTATION TYPE LISTED LAST WAS FOUND TO BE THE MOST PERSUASIVE (AS MEASURED BY ATTITUDE CHANGE).